

Operators Manual

Refrigerated Recirculating Chillers

**Powerful Cooling
Microprocessor Controller
Digital Set & Read with
High Flow Centrifugal Pump,
Positive Displacement Pump or
Turbine Pump**

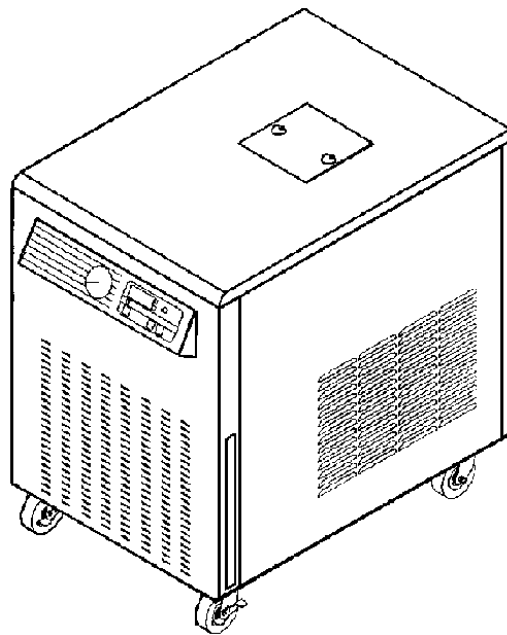


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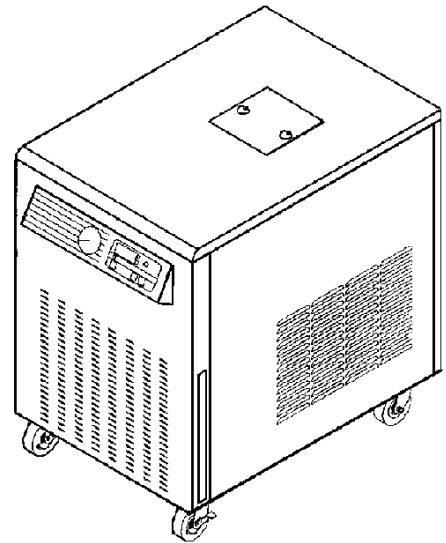
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This symbol marks chapters and sections of this instruction manual which are particularly relevant to safety.

When attached to the unit, this symbol draws attention to the relevant section of the instruction manual.



This symbol indicates hazardous voltages may be present.

Section 1 - General Information

1.1 Warranty

Thank you for your purchase. We are confident it will serve you for a long time. Our warranty to you is as follows:

The manufacturer agrees to correct for the original user of this product, either by repair, or at the manufacturer's election, by replacement, any defect which develops after delivery of this product within the period as stated on the warranty card. In the event of replacement, the replacement unit will be warranted for 90 days or warranted for the remainder of the original unit's parts or labor warranty period, whichever is longer.

If this product should require service, contact the manufacturer/suppliers' office for instructions. When return of the product is necessary, a return authorization number will be assigned and the product should be shipped, transportation charges pre-paid, to the indicated service center. To insure prompt handling, the return authorization number should be placed on the outside of the package and a detailed explanation of the defect enclosed with the item.

This warranty shall not apply if the defect or malfunction was caused by accident, neglect, unreasonable use, improper service, or other causes not arising out of defects in material or workmanship. There are no warranties, expressed or implied, including, but not limited to, those of merchantability or fitness for a particular purpose which extends beyond the description and period set forth herein. The manufacturer's sole obligation under this warranty is limited to the repair or replacement of a defective product and the manufacturer shall not, in any event, be liable for any incidental or consequential damages of any kind resulting from use or possession of this product.

Some states do not allow: (A) limitations on how long an implied warranty lasts or (B) the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights. You may have other rights which vary from state to state.

1.2 Unpacking

Your recirculating chiller is shipped in a special carton. Retain the carton and all packing materials until the unit is completely assembled and working properly. Set up and run the unit immediately to confirm proper operation. Beyond one week, your unit may be warranty repaired, but not replaced. If the unit is damaged or does not operate properly, contact the transportation company, file a damage claim, then contact the company where your unit was purchased.

1.3 Package Contents

- Recirculating Chiller
- Operators Manual
- Warranty Card
- 2 sets of Inlet/Outlet Adapters: 1/2 inch I.D. tubing; 5/8 inch I.D. tubing
- Durable Tubing, 1/2 inch I.D.

1.4 Description

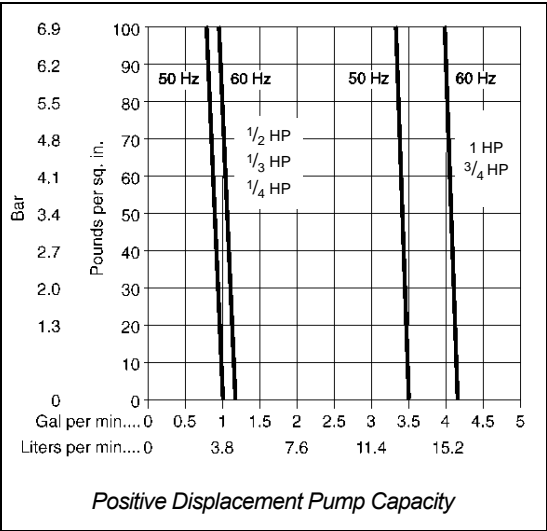
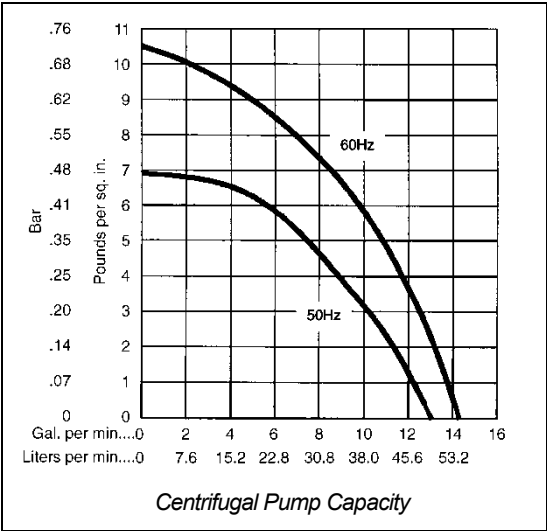
These chillers provide cooling power for demanding applications, and economically replace tap water cooling systems. All models have a microprocessor controller, digital set/read and readout in °C or °F. The refrigeration system has modulation capability to provide cooling as needed and thus greater temperature stability and longer compressor life. Wetted parts are brass, copper, polypropylene, PVC, nylon and stainless steel.

1.5 Chiller Specifications and Pump Performance

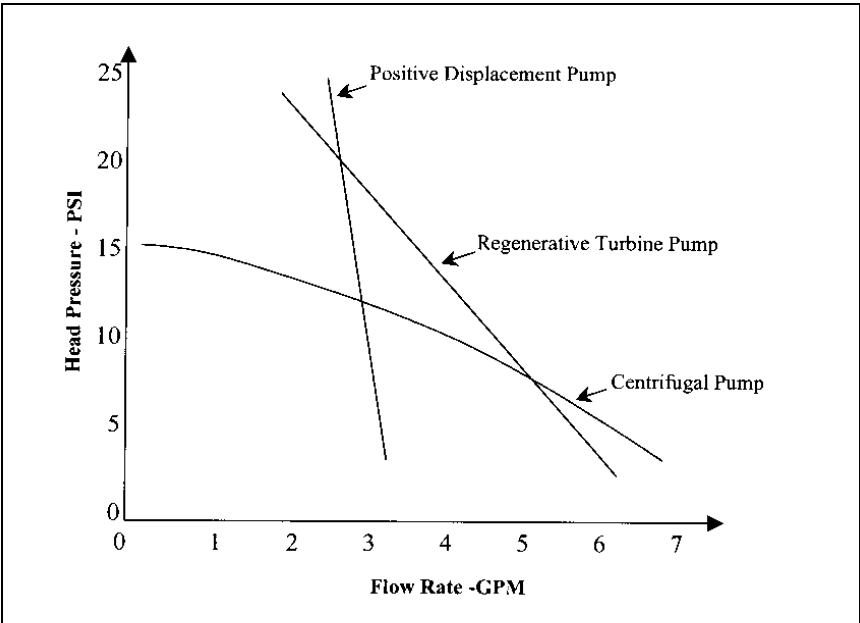
General Specifications To All Chillers

Temperature Setability	± 0.1°C
Temperature Uniformity	± 0.5°C
Readout Selectability	°C or °F
Pump Inlet & Outlet	1/2 inch NPT

Pump Performance



Comparison of Pump Options



6000 Series Standard Chillers with Magnetic Drive Centrifugal Pump			
Model	6205	6305	6505
Operating Temperature	-5° to 40°C	-5° to 40°C	-10° to 40°C
Compressor	1/4 hp	1/3 hp	1/2 hp
Cooling Capacity @ 20°C	750 Watts	1200 Watts	1320 Watts
10°C	450 Watts	825 Watts	1055 Watts
0°C	100 Watts	375 Watts	550 Watts
Pressure at 0 Flow Rate	10 psi	10 psi	10 psi
Flow Rate @ 0 psi	4.3 gpm / 16.3 lpm	4.3 gpm / 16.3 lpm	4.3 gpm / 16.3 lpm
Reservoir Capacity	1.65 gal / 6.25 liters	1.65 gal / 6.25 liters	1.65 gal / 6.25 liters
Dimensions (in.)	24 x 14 ³ / ₈ x 26 ¹ / ₂	24 x 14 ³ / ₈ x 26 ¹ / ₂	24 x 14 ³ / ₈ x 26 ¹ / ₂
h x w x d (cm)	61 x 36.5 x 67.3	61 x 36.5 x 67.3	61 x 36.5 x 67.3
Shipping Weight	155 lbs	165 lbs	170 lbs
Volts, Hz, Amps	120V, 60Hz, 6.8A	120V, 60Hz, 8A	120V, 60Hz, 13A
Volts Range	108V to 132V	108V to 132V	108V to 132V
60Hz Cat. No.	080501	080511	080521
Volts, Hz, Amps	240V, 50Hz, 3.4A	240V, 50Hz, 4A	240V, 50Hz, 6.5A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080506	080516	080526
Additional Specifications for "P" Series 6000 Chillers with Positive Displacement Pump			
Model "P" Series	6205P	6305P	6505P
Flow Rate @ 0 psi	1 gpm / 3.8 lpm	1 gpm / 3.8 lpm	1 gpm / 3.8 lpm
Pump Pressure (Adjustable)	20 to 100psi	20 to 100psi	20 to 100psi
Shipping Weight	160 lbs	170 lbs	170 lbs
Volts, Hz, Amps	120V, 60Hz, 9.6A	120V, 60Hz, 10.8A	120V, 60Hz, 15.8A
Volts Range	108V to 132V	108V to 132V	108V to 132V
60Hz Cat. No.	080502	080512	080522
Volts, Hz, Amps	240V, 50Hz, 4.8A	240V, 50Hz, 5.4A	240V, 50Hz, 8A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080507	080517	080527
Additional Specifications for "T" Series 6000 Chillers with Turbine Pump			
Model "T" Series	6205T	6305T	6505T
Flow Rate @ 0 PSI	3.5 gpm / 13.2 lpm	3.5 gpm / 13.2 lpm	3.5 gpm / 13.2 lpm
Pump Pressure (Adjustable)	20 to 100psi	20 to 100psi	20 to 100psi
Volts, Hz, Amps	120V, 60Hz, 9.6A	120V, 60Hz, 10.8A	120V, 60Hz, 15.8A
Volts Range	108V to 132V	108V to 132V	108V to 132V
60Hz Cat. No.	080503	080513	080523
Volts, Hz, Amps	240V, 50Hz, 4.8A	240V, 50Hz, 5.4A	240V, 50Hz, 8A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080508	080518	080528
Environmental Conditions • Indoor Use Only • Maximum Altitude : 2000 meter • Relative Humidity : 80% for temperatures to 30°C • Class 1 : Residential, Commercial, Light Industrial • Operating Ambient : 5° to 30°C • Pollution Degree : 2 • Class 2 : Heavy Industrial			

Notes: Refer to the serial number plate on rear of the chiller for model and electrical data.

Cooling Capacity, Watts x 3.41 = BTUs/hr. Performance specifications determined at ambient temperature of 20°C/68°F.

For 50Hz models, derate cooling capacity and pump flow by 17%.

External Pressure Reducing Assembly (for Positive Displacement Pump models) Steps down high outlet pressure to 10 to 45 psi. Cat. No 060302

6000 Series Standard Chillers with Magnetic Drive Centrifugal Pump			
Model	6705	6105	6155
Operating Temperature	-15° to 40°C	-15° to 40°C	+5° to 35°C
Compressor	3/4 hp	1 hp	1 1/2 hp
Cooling Capacity	@20°C 2500 Watts @10°C 1700 Watts @ 0°C 760 Watts	@20°C 2850 Watts @10°C 1925 Watts @ 0°C 940 Watts	@20°C 5200 Watts @10°C 3600 Watts @ 5°C 2700 Watts
Pressure at 0 Flow Rate	10 psi	10 psi	10 psi
Flow Rate @ 0 psi	4.3 gpm / 16.3 lpm	4.3 gpm / 16.3 lpm	4.3 gpm / 16.3 lpm
Reservoir Capacity	1.65 gal / 6.25 liters	1.65 gal / 6.25 liters	6.25 gal / 23.65 liters
Dimensions (in.) h x w x d (cm)	24 x 14 3/8 x 26 1/2 61 x 36.5 x 67.3	24 x 14 3/8 x 26 1/2 61 x 36.5 x 67.3	30 x 21 x 27 76.2 x 53.3 x 68.6
Shipping Weight	178 lbs	178 lbs	450 lbs
Volts, Hz, Amps	208-230V, 60Hz, 7.5A	208-230V, 60Hz, 8A	208-230V, 60Hz, 12A
Volts Range	187V to 253V	187V to 253V	187V to 253V
60Hz Cat. No.	080531	080542	080593
Volts, Hz, Amps	240V, 50Hz, 7.5A	240V, 50Hz, 8.5A	240V, 50Hz, 12A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080536	080546	080594
Additional Specifications for "P" Series 6000 Chillers with Positive Displacement Pump			
Model "P" Series	6705P	6105P	6155P
Flow Rate @ 0 psi	4 gpm / 15.2 lpm	4 gpm / 15.2 lpm	4 gpm / 15.2 lpm
Pump Pressure (Adjustable)	20 to 100psi	20 to 100psi	20 to 100psi
Shipping Weight	178 lbs	178 lbs	450 lbs
Volts, Hz, Amps	208-230V, 60Hz, 10A	208-230V, 60Hz, 11A	208-230V, 60Hz, 12A
Volts Range	187V to 253V	187V to 253V	187V to 253V
60Hz Cat. No.	080532	080544	080596
Volts, Hz, Amps	240V, 50Hz, 10A	240V, 50Hz, 11A	240V, 50Hz, 12A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080537	080547	080597
Additional Specifications for "T" Series 6000 Chillers with Turbine Pump			
Model "T" Series	6705T	6105T	6155T
Flow Rate @ 0 PSI	3.5 gpm / 13.2 lpm	3.5 gpm / 13.2 lpm	3.5 gpm / 13.2 lpm
Pump Pressure (Adjustable)	20 to 100psi	20 to 100psi	20 to 100psi
Volts, Hz, Amps	208-230V, 60Hz, 9.6A	208-230V, 60Hz, 10.8A	208-230V, 60Hz, 12A
Volts Range	108V to 132V	108V to 132V	187V to 253V
60Hz Cat. No.	080533	080543	080598
Volts, Hz, Amps	240V, 50Hz, 9.6A	240V, 50Hz, 10.8A	240V, 50Hz, 12A
Volts Range	198V to 264V	198V to 264V	198V to 264V
Over Voltage: Category II			
50Hz Cat. No.	080538	080548	080599
Environmental Conditions	<ul style="list-style-type: none"> Indoor Use Only Maximum Altitude : 2000 meter Relative Humidity : 80% for temperatures to 30°C Class 1 : Residential, Commercial, Light Industrial 		
	<ul style="list-style-type: none"> Operating Ambient : 5° to 30°C Pollution Degree : 2 Class 2 : Heavy Industrial 		

Notes: Refer to the serial number plate on rear of the chiller for model and electrical data.

Cooling Capacity, Watts x 3.41 = BTUs/hr. Performance specifications determined at ambient temperature of 20°C/68°F.
For 50Hz models, derate cooling capacity and pump flow by 17%.

External Pressure Reducing Assembly (for Positive Displacement Pump models) Steps down high outlet pressure to 10 to 45 psi. Cat. No 060302

Section 2 - Set Up



Before proceeding, be sure all power is off

2.1 Location

Locate the chiller on a strong, level surface. Insure easy access to the top cover and position the chiller for unobstructed air flow through the front and rear screens. The front wheels can be locked to keep the chiller in place while in use. Avoid voltage drops by using properly grounded power outlets wired with 14 gauge or larger diameter wire. If possible, be close to the power distribution panel. Minimize low line voltage problems by eliminating the use of extension cords.

2.2 Reservoir Fluids

For most applications above +15°C, distilled water is satisfactory. For operation below +15°C, the chiller MUST be protected with an antifreeze solution. Ethylene glycol (laboratory grade) and water in a 50/50 mixture is satisfactory from +15°C to -15°C. Select a fluid that is compatible with the chiller's wetted parts of brass, copper, polypropylene, PVC, nylon and stainless steel. Only use fluids that will satisfy safety, health and equipment compatibility requirements. **CAUSTIC, CORROSIVE OR FLAMMABLE FLUIDS MUST NEVER BE USED.**



Do not use a flammable fluid as a fire hazard may result.



WARNING!

Operation below +15°C requires antifreeze in the circulating fluid.

2.3 Pump, Hoses and Couplings

To maintain a safe workplace and to avoid leaks, special care should be taken when choosing hoses and connectors for the chiller.

1. Pressure ratings - Hoses should be able to withstand the largest pressure that they will encounter. For positive displacement pump models, this is 100 psi.
2. Flexible tubing - Avoid tubing that will expand and take up fluid volume when operating at the desired pressure.
3. Hose diameter - The fittings on the chiller Outlet and Inlet lines are internally threaded, 1/2 inch I.D. N.P.T. The 2 adapters sets supplied are for 1/2 inch I.D. tubing and 5/8 inch I.D. tubing. Other fittings can be used if a smaller hose diameter is desired. Remember that the operating pressure in the circulating system increases when using a smaller diameter hose.
4. Couplings & Clamps - The use of screw-tightened hose clamps is necessary on all joints to insure good, tight connections. Quick connectors are not recommended because they have the potential for restricting flow rate.



IMPORTANT!

Chillers equipped with a high pressure positive displacement pump have a pressure regulator inside of the chiller and a pressure gauge on the control panel. To access this regulator, remove the rear air grille. The valve is located to the right. On models 6107 & 6705, 6155 the regulator is located center point, upper grille (rear).

The Pressure Valve is **FACTORY ADJUSTED** to 40psi. If you do **NOT** want to operate at this pressure, or do not know what your operating pressure should be, start at a lower operating pressure. Reduce the pressure by turning the valve counterclockwise (unscrew outward) before starting the chiller.

With the chiller fully connected and running, read the pressure gauge and turn the regulator to the desired pressure. If required, an optional external pressure reducing assembly is available for this pump to reduce the pressure to 10 - 45 psi.

2.4 Setting Up a Closed System or Cooling Coil to the Chiller

1. Connect your closed cooling system to the chiller with hoses or pipes. The direction of the flow through the system can be controlled by the way the hoses or pipes are connected to the chiller. The "Inlet" will draw liquid into the chiller; the "Outlet" will pump liquid out.
2. Turn the access panel screws to remove the top cover and expose the reservoir. Turn the filler cap and lift up to remove. Use a funnel to fill the reservoir with fluid. When full, remove the funnel, but do not replace the cap at this time. Check hoses and fittings for tightness and be sure there are no bends or crimps in the hoses.
3. Plug the chiller into the proper AC outlet (unit's electrical requirements on rear of unit). Press the **POWER ON** button. The chiller will begin pumping liquid through your system. Check for leaks.
4. With the pump running, the reservoir's fluid level will decrease as the closed system begins to fill. Add a little fluid at a time until the level in the reservoir stops going down. This means that your system is filled and the air has been purged from it. Replace the reservoir cap and turn it clockwise to lock it. Recheck the cap for tightness.

Note: When chillers with the standard magnetic drive centrifugal pump are connected to an external apparatus with a built-in flow shut-off, an external bypass loop assembly (pt.# 510-147) may be needed if operating below 20°C. This bypass assembly continues fluid circulation to and from the pump even though the main flow to the external apparatus has been blocked.

2.5 Setting Up an Open Bath System to the Chiller

1. Connect hoses to the Inlet and Outlet fittings on the back of the chiller. The "Inlet" draws fluid into the chiller, the "Outlet" pumps fluid out. Fill the open bath. Considering this flow, position the hoses in your bath for a good circular flow and stirring motion.
2. Turn the panel screws to remove the top cover and access the reservoir. Turn and lift the filler cap to remove. Use a funnel to fill the reservoir with the same fluid in your bath. This primes the pump and helps establish a flow when the chiller is turned on.
3. Replace the reservoir cap and turn to lock it. Check for tightness. Check all hoses and fittings. Be sure there are no bends or crimps in the hoses, and that the hose attached to the chiller's inlet is submerged near the bottom of the bath. Secure the inlet and outlet hoses to the open tank so they do not move when pumping starts. The bath's fluid level will drop slightly as the hoses in the system fill up with fluid. The bath's fluid must cover the chiller's inlet hose.
4. Plug the unit into the proper AC outlet (unit's electrical requirements on rear of unit). Press the **Power On** button. The chiller will begin pumping fluid through your system. Check for leaks.

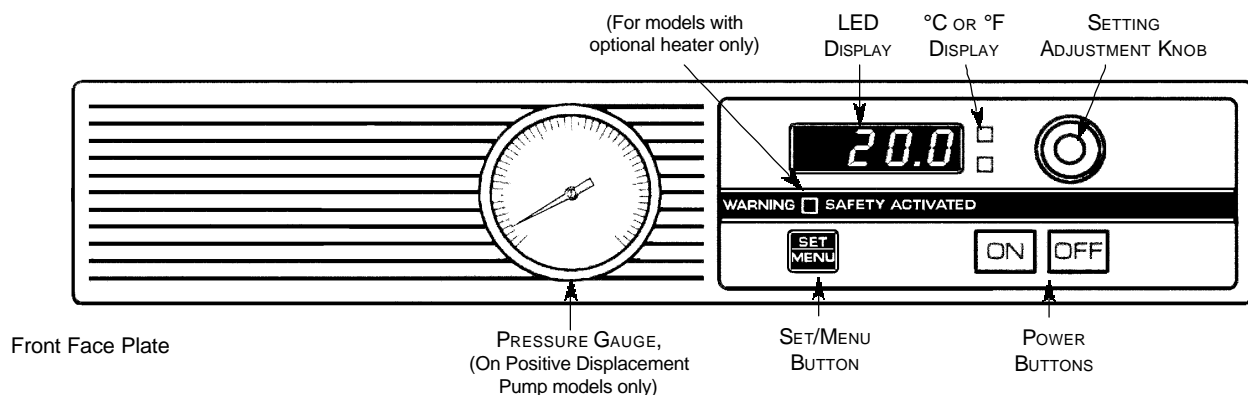
Section 3 - Operation

3.1 Power Requirements



Caution! Be sure that the power supply is the same voltage as specified on the nameplate

With the chiller plugged in (before pressing the POWER ON button), the display responds by showing standby (....). If there is no response, check that the circuit breaker on the rear of the chiller is in the ON position. An extension cord is not recommended.



3.2 Temperature Setting and Adjustments

After setting up and filling the chiller:

1. Press the POWER ON button. The LED display indicates (8888), the power up self test. When the chiller is turned on, there is a 60 second time-out period. During this time the controller is performing a self-diagnostic and a balancing of pressure across the compressor inlet and outlet. (a balanced system reduces the AC current required to start up the compressor and will result in an extended compressor life.) The pump is active during the start delay period. When the time out period reaches zero, the compressor starts and the chiller is then fully operational.

Upon completion of the self test, the actual fluid temperature is displayed. Your desired operating temperature can now be set.

2. Press the SET/MENU button. The degree lights flash indicating the temperature can be set or changed. Turn the SETTING ADJUSTMENT knob to the desired setting. This setting is accepted after pressing the SET/MENU button or will be automatically accepted after a few seconds of keypad inactivity. The degree light stops flashing and the display shows the actual temperature.
3. The SET TEMPERATURE may be checked at any time by pressing and releasing the SET/MENU button. Allow sufficient time for the chiller to stabilize at the desired temperature.

3.3 Selection of Celsius or Fahrenheit

To change the readout to °C or °F:

1. Press and hold the Set/Menu button until the display reads "UNITS".
2. Press Set/Menu again then turn the Setting Adjustment knob and select °C or °F.
3. Press Set/Menu or the setting will be accepted after a few seconds.

3.4 Setting the Readout High Limit

This feature limits the readout setability so the operating temperature setting cannot easily be set above the High Limit you select. It is not an over temperature feature which shuts off the chiller.

To set the readout High Limit:

1. Press and hold the Set/Menu button until the display reads "UNITS".
2. Turn the Setting Adjustment knob until the display reads "HI-L".
3. Press the Set/Menu button, enter the desired value using the Setting Adjustment knob.
4. Press Set/Menu and the display will again read "HI-L". The Setting Adjustment knob can be turned to access another menu option or you can wait until the entered value has been accepted. When the value is accepted, the degree light will stop flashing and the fluid temperature will be displayed.

3.5 Controller Display Messages

Display	Message
--Normal Screens--	
....	Standby mode. Unit plugged in. Power switch OFF, rear circuit breaker on
8888	Power up self test displayed when power button initially pressed on
--Menu Screen--	
Unit	Change to °F or °C
Unit/Hi-L	Limits operating temperature setability
--Error Screens--	
E-tF	Triac (alternistor) failure
DEF	Displayed when chiller is reset to factory default settings
--Optional Equipment (Flow or Float Switch)--	
E-nF	No Flow
E-FL	Low Level Fluid

3.6 Draining the Unit

Press the Power Off button and unplug the chiller. Remove drain plug and reservoir cap and allow unit to drain. Syphon or use a small manual pump to remove all fluid from the reservoir.

Run the unit intermittently (5 to 10 seconds each time) to pump the water from the system. Stop pumping when the fluid is reduced to a trickle. Running for a longer period will cause damage to the positive displacement pump. Open the reservoir and use suction or a hand pump to remove any remaining water.

Prior to storage or shipping: Water MUST be removed from ALL parts of the chiller system, or an ANTIFREEZE must be added to insure that internal damage does not occur.

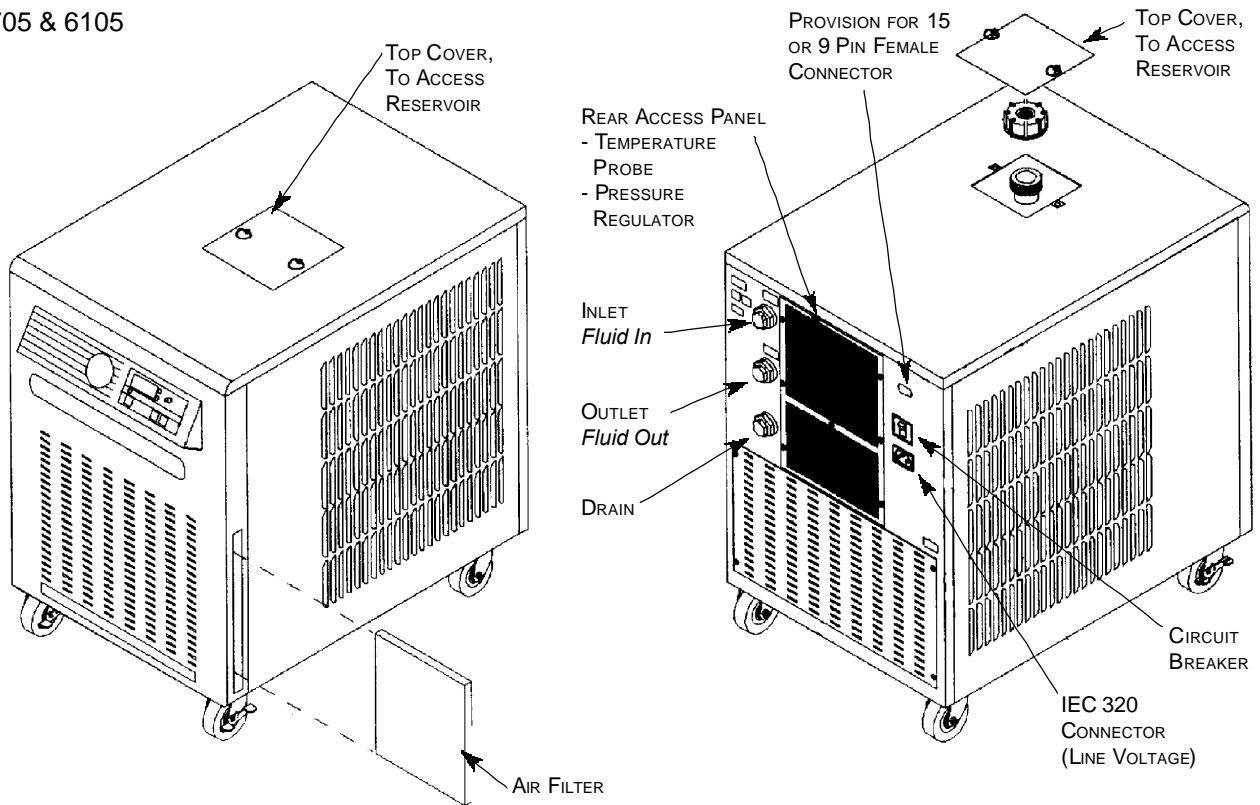
3.7 Controller Default Settings

To return to the factory default values:

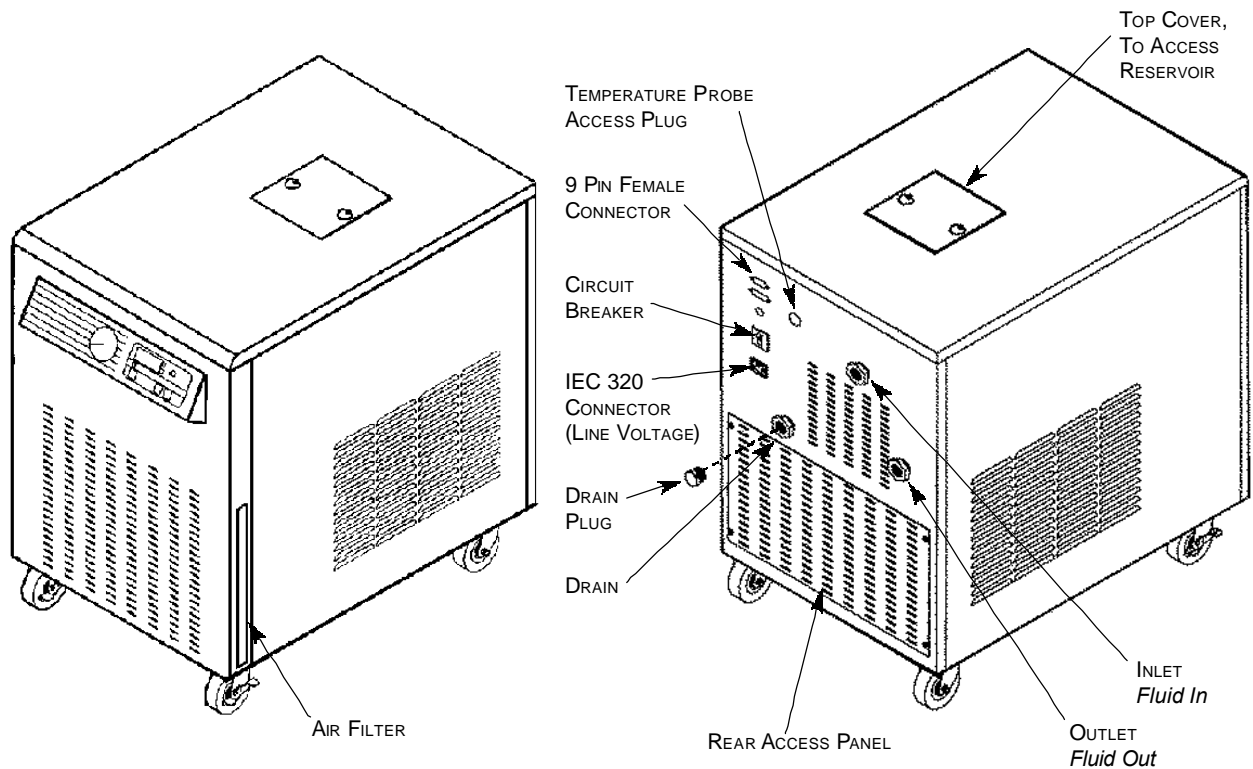
1. Press and hold the Power On button, then turn off at the circuit breaker.
2. Still holding Power On, hold the Set/Menu button while turning the unit on by the circuit breaker.
3. The controller will display "DEF" and go to the standby mode.
4. Your set temperature and other settings will have to be reset.

Section 4 - Diagram of Models

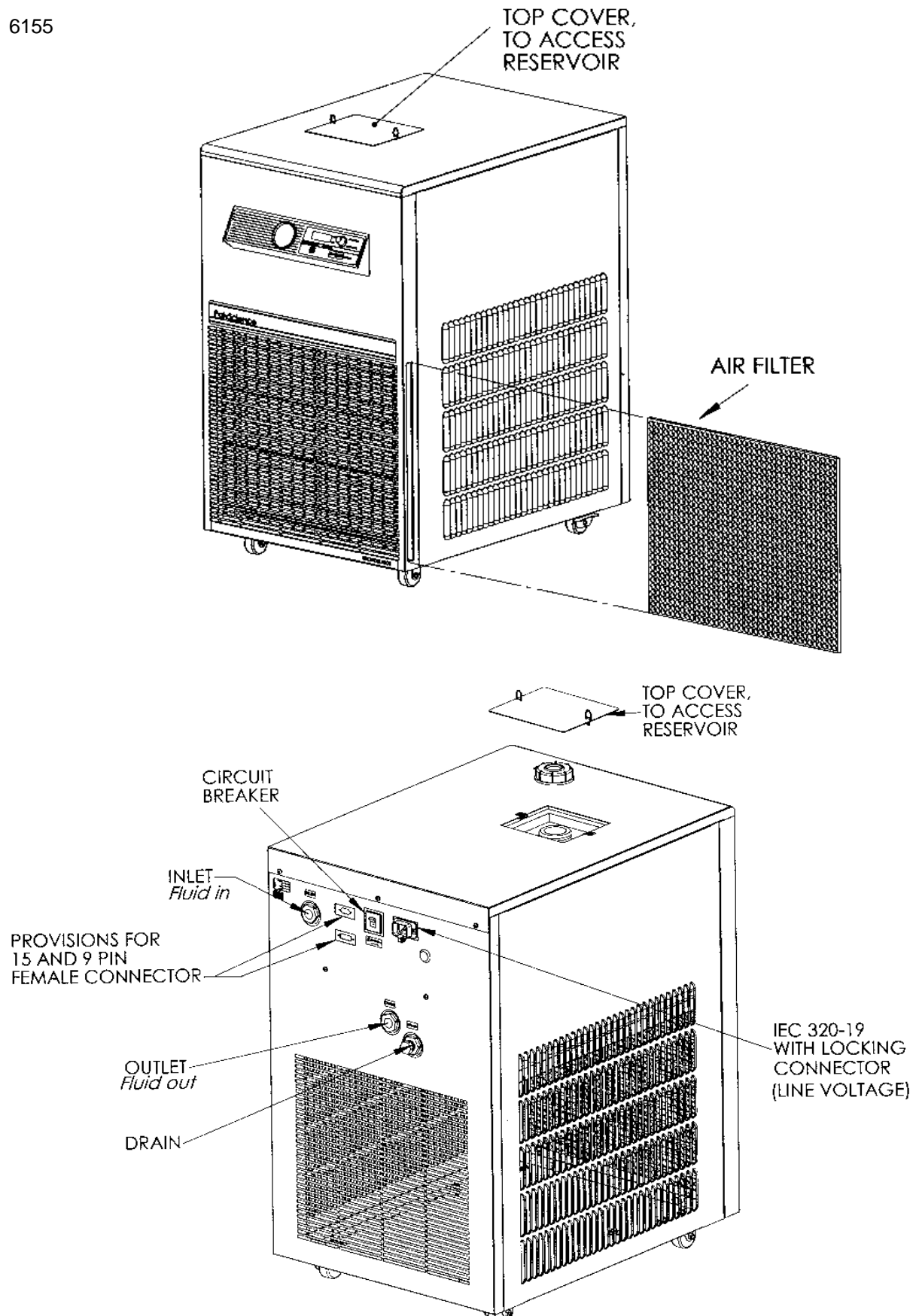
6705 & 6105



6205 & 6305 & 6505



6155



Section 5 - Maintenance

Prepare a schedule to perform these specific maintenance tasks at their recommended intervals.

5.1 Standard Magnetic Drive Centrifugal Pump Motor

When the chiller is used continuously, this pump motor must be oiled every 6 months with SAE 20 oil. Press the POWER OFF and unplug the chiller. Remove the rear access panel to gain access to the two oil ports located on the pump motor. Do not apply excessive amounts of oil.

(On models 6105, 6705 and 6155, remove the side panel to access the pump)

5.2 Positive Displacement and Turbine High Pressure Pump Motor

The bearings of the pump, require periodic oiling. Press POWER OFF and unplug the chiller. Remove the rear access panel to gain access to the pump.

With heavy use, oil every year. With medium use, oil every 3 years. With light use, oil every 5 years.

Use about 150 drops (1 teaspoon) of SAE 20 oil in each bearing.

(On models 6105, 6705 and 6155, remove the right side panel to access the pump)

5.3 Fluid Filter Included With High Pressure Pump

To optimize flow and prevent pump damage due to scale or foreign particles, a filter is included with the high pressure pump models. How often the filter requires maintenance depends on the environment and use of the chiller.

To access this filter remove the left side panel. The water filter is located behind the side brace. Grip the plastic sediment bowl firmly and turn counter-clockwise to remove it. Clean the stainless steel wire screen found inside and replace it in the filter holder. Do not replace the filter screen unless it is damaged.

(On models 6105 and 6705, remove the right side panel to access the water filter and pump. On model 6155, you must remove the top panel in order to remove the side panel. After removing the side panel, you will have access to the water filter.)

5.4 Refrigeration Air Filter & Air Vents

For maximum cooling efficiency, the condenser and the front and back air vents should be kept free of dust and dirt. Dirt thermally insulates the condenser coils and reduces the cooling capacity of the refrigeration system.

Set up a periodic schedule to clean the removable air filter at least monthly. Tap water and mild detergent is sufficient to clean filter material. Frequency of cleanings depends on the atmospheric conditions around the chiller as well as length of operating time.

